

ABSTRACT

A lossless (or low loss) transmission line can be constructed using an auxiliary conductor inductively coupled to the primary conductor and driven by the primary conductor through an active shunt network distributed along the transmission line. The auxiliary conductor is placed close enough to the primary conductor so that the two conductors have a substantial amount of mutual inductance compared to their self-inductance. The transmission line can be operated in differential mode. In one embodiment, a combination of conductance and transconductance are used to cancel losses and control dispersion in the transmission line for high frequency signal transmission. Transconductance is achieved in a differential transmission line by inducing a signal from each transmission line into closely coupled parallel lines, adding active elements between each of the coupled lines to a common ground plane and controlling the current through each active element by the signal on the opposite transmission line.